

3.3. FISHERIES

INTRODUCTION

The elements addressed in this section include stream conditions and the aquatic species found in areas potentially affected by the project along with the affects of the project on those species and their habitats. See previous sections/chapters for a complete list of projects considered under this action including watershed restoration, timber harvest (including roadside), road work etc.

SCOPE OF THE ANALYSIS

The fisheries analysis area includes watersheds within American River and Crooked River. The area also includes the South Fork Clearwater River from headwaters to the confluence with the Middle Fork Clearwater River. The prescription watersheds within the project area in American River include; Upper American River; (Middle) American River; Lower American River; East Fork American River; Kirks Fork; Whitaker Creek; Queen Creek; Flint Creek; Box Sing Creek. In Crooked River they include; Lower Crooked River; Relief Creek; and Middle Crooked River.

The upper South Fork Clearwater watershed is primarily under Federal management including lands managed by the Bureau of Land Management. American River includes the Elk City Township, which has mixed ownership and a long history of development. The lower portion of the sub-basin is of mixed ownership.

Direct, indirect, and cumulative effects have been analyzed for streams within the project area and downstream to and including the South Fork Clearwater River.

Indicators used to analyze effects on fish and their habitat include sediment yield, acting large woody debris, pool habitat, water yield, water quality including toxicants and stream temperature, and habitat connectivity/passage. Effects on habitat from changes in sediment and water yield are discussed with frequent reference to the Watershed section, where these changes have been modeled and are displayed for each watershed.

REGULATORY FRAMEWORK

NEZ PERCE NATIONAL FOREST PLAN DIRECTION

FISH/WATER QUALITY OBJECTIVES

Appendix A of the Nez Perce Forest Plan lists fish/water quality objectives by prescription watershed for streams in the analysis area (see Appendix E). The plan recognizes that most of the project area streams do not meet their objectives. The plan also allows for activities to proceed in these below objective watersheds, as long as we concurrently work toward a positive upward trend in fish habitat carrying capacity. Watersheds like American River and Middle Crooked River pose a unique situation in that they are not a single complete drainage (see Watershed above and Appendix E).

THE DESIRED FUTURE CONDITION TABLES

To estimate natural fish habitat potential and quantify existing stream conditions as required by the Forest Plan, the Nez Perce National Forest is using a Desired Future Condition (DFC) Model developed on the Clearwater National Forest (Espinosa 1992). This model addresses specific conditions and channel types found on the Nez Perce Forest using a habitat quality index. Values for the habitat parameters are quantified in a set of desired future condition (DFC) tables. The DFC tables list the specific fish habitat parameter and a value or range that a stream should have in order to be at a given percentage of the streams potential and to meet the Forest Plan

Objectives for that watershed. The DFC values, habitat parameter data and their relationships are stratified by channel types and fish species. The values for the fish habitat parameters listed in the DFC tables are considered achievable for streams under natural conditions in the absence of major disturbances or are reflective of what good fish habitat should be. Most of the habitat parameters are consistent for each species, and they vary slightly by channel type. Past work has shown a need to adjust some of the elements to better-fit natural conditions and what is achievable. The DFC for acting and potential woody debris in a meadow channel is often used as an example of this.

UPWARD TREND

The Nez Perce Forest Plan provides direction that timber harvest in sediment-limited watersheds that do not meet their Fish/Water Quality objectives, as listed in Appendix A, would occur only where concurrent watershed improvement efforts result in a positive upward trend in habitat condition. Many of the area streams do not meet their objectives and are in this category.

Project activities under this planning document will occur in nine prescription watersheds in American River and three prescription watersheds in Crooked River.

RIPARIAN HABITAT CONSERVATION AREAS

In addition, the Nez Perce Forest Plan defines standards for vegetation management in riparian areas (Management Area 10), which are collectively defined as lakes, lakeside lands, perennial streams, seasonally flowing streams supporting riparian vegetation, and adjoining lands that are dominated by riparian vegetation (NPFP III-30-33). This area includes the floodplains of streams and the wetlands associated with springs, lakes, and ponds. The guidelines are included in Appendix E.

NEZ PERCE NATIONAL FOREST PLAN AMENDMENT 20 (PACFISH)

The PACFISH Environmental Assessment amended the Nez Perce Forest Plan in 1995 and is incorporated as Amendment 20. PACFISH establishes riparian goals, riparian management objectives (RMOs), and defines riparian habitat conservation areas (RHCAs). It includes specific direction for land management activities within riparian areas adjacent to streams, lakes, wetlands, and landslide-prone terrain. Riparian goals establish an expectation of the characteristics of healthy, functioning watersheds, riparian areas, and fish habitat. The goals direct the Forest to maintain or improve habitat elements such as water quality, stream channel integrity, instream flows, riparian vegetation, and several others.

Riparian management objectives (RMOs) for stream channel condition provide the criteria against which attainment, or progress toward attainment, of the riparian goals is measured. They include habitat attributes such as number of pools, amount of large wood in the channel, stability of the stream banks, and width-to-depth ratio. The areas adjacent to streams and wetlands (RHCAs) were established in PACFISH to maintain the integrity of aquatic ecosystems. Healthy riparian areas are essential to maintaining or improving the quality of fish habitat in streams. This analysis will use a combination of DFC and RMO values to define existing conditions in watersheds where activities occur. See Appendix E for specific direction contained in Forest Plan Amendment 20 (PacFish).

ENDANGERED SPECIES ACT AND BIOLOGICAL OPINIONS FROM NMFS AND USFWS

The American and Crooked River Area have been designated as priority watersheds, as directed by the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) for recovery of ESA listed fish species. These regulatory agencies issued Biological Opinions for

Land and Resource Management Plans (LRMP) in 1998 with the following relevant guidelines for priority watersheds.

- Watershed analysis must be conducted prior to harvest, salvage, or thinning activities in RHCAs, and demonstrate action would not retard/prevent attainment of RMOs or adversely affect listed fish.
- Watershed analysis must be conducted if watershed's ECA exceeds 15 percent, if harvest activities would increase ECA.
- For new/proposed roads, if road density exceeds 2 miles/mi², reduce road mileage and emphasize road closure, obliteration, and revegetation.
- The 1998 steelhead BO added sediment RMO, incorporated by reference from the 1995 BO for Chinook salmon. This RMO includes standards of <20 percent surface fines in spawning habitat or <30 percent cobble embeddedness in rearing habitat.

The Endangered Species Act also provides direction that federal agencies would consult on all activities that may affect listed species and/or their habitat.

It is the policy of Congress that all Federal departments shall seek to conserve endangered species and threatened species and shall utilize their authorities in furtherance of this purpose (ESA 1531.2b).

MAGNUSON-STEPHENS ACT

Pursuant to section 305(b) of the Magnuson-Stevens Act and its implementing regulations, 50 CFR Part 600.920, Federal agencies must consult with NMFS regarding any of their actions authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken that may adversely affect Essential Fish Habitat (EFH). The Magnuson-Stevens Act, section 3, defines EFH as “those waters and substrate necessary for fish for spawning, breeding, feeding, or growth to maturity.” Federal agencies may incorporate an EFH Assessment into ESA Biological Assessments. The final EIS will include an EFH assessment for Chinook salmon and Coho salmon that occur in the Clearwater River basin HUC (17060305).

PROJECT AREA THEMES AND FISH SPECIES

AQUATIC THEMES

The South Fork Clearwater River Landscape Assessment (March 1998), developed functional themes for each Ecological Reporting Unit (ERU).

American River has a high to very high habitat for aquatic species. Spring Chinook habitat potential is very high in Lower American River. Very high potential westslope cutthroat habitat exists throughout the watershed, with the high order streams providing high potential sub adult/adult rearing and spawning habitat. Steelhead habitat potential is rated as high for this watershed. Bull trout habitat potential in this watershed is rated as high, with the higher order channels in the lower watershed constituting important sub adult/adult rearing. American River is assigned a rating of High Priority, Restore Aquatic process.

The Landscape Assessment highlights historic mining in both of these drainages as a primary impact to fish habitat and aquatic process. American River also has a history of impacts from private land development, cattle grazing, timber harvest and road building.

The Lower Crooked River has a rating of Very High Priority, Restore Aquatic Process. The Crooked River/American River project is within the Lower Crooked River ERU. The less disturbed

Upper Crooked River is assigned a rating of Very High Priority, Conserve Existing Aquatic Function. Crooked River has less of a history of cattle grazing but timber harvest and road construction have impacted the Lower Crooked River as well.

Crooked River has a very high habitat potential for spring Chinook and steelhead in the lower portion, and a very high potential for bull trout and westslope cutthroat in the upper watershed.

THREATENED AND ENDANGERED FISH SPECIES

STEELHEAD TROUT

Steelhead Trout (*Oncorhynchus mykiss gairdneri*) in the Snake River basin are listed as a threatened species under the Endangered Species Act (Federal Register Vol. 62, No. 159, August 18, 1997). Steelhead trout are distributed throughout the South Fork Clearwater sub basin and the American and Crooked River watersheds (USDA 1999). The South Fork Clearwater sub basin and all accessible tributaries were proposed as critical habitat for steelhead (Federal Register Vol. 64, No. 24, February 5, 1999), but this proposal was recently rescinded, and the critical listing process has been recently reinitiated. It is likely that the South Fork Clearwater River and American and Crooked Rivers will be included as critical habitat when this designation is final.

Steelhead trout in Idaho are the anadromous form of rainbow trout, which have been further classified as redband trout of the Columbia River basin (Behnke 2002). “Anadromous” refers to a life history whereby fish spawn and rear in freshwater but migrate to the ocean before maturing and returning to fresh water to spawn. Steelhead trout and most species of salmon follow an anadromous life history, and adults of both may attain large size as a result of time spent in the ocean. Populations of redband trout in the Columbia River basin, including those in Idaho, generally follow either an anadromous or resident life history. Some stream systems may support both types of individuals.

Steelhead trout spawning and rearing in the American River and Crooked River area generally enter fresh water in late summer and fall, spend the winter in the lower and middle Clearwater River below Kooskia, and migrate up the South Fork Clearwater River in early spring. Spawning usually occurs in April and May, probably in the mainstem and lower reaches of tributary streams. Juveniles usually spend about two years in streams and rivers, sometimes three, before migrating downstream to the ocean during the spring runoff period in May and June (Behnke, 2002).

In the American River, juvenile steelhead trout have been documented in Upper, Middle and Lower American River, East Fork American River, Flint Creek and Box Sing Creek. In Crooked River, juvenile steelhead trout have been documented in Lower Crooked River, Relief Creek, Middle Crooked River, Silver Creek and Quartz Creek.

BULL TROUT

Bull trout (*Salvelinus confluentus*) in the Columbia River basin have been listed as threatened under the Endangered Species Act (Federal Register Vol. 63, No. 111, June 10, 1998). Critical habitat for bull trout has been proposed by the U.S. Fish and Wildlife Service (Federal Register Vol. 67, No. 71235, 2002) and is under review at this time. American River and Crooked River are included as proposed critical habitat.

Bull trout are actually a char and are included in the genus *Salvelinus*, along with brook trout, lake trout, Dolly Varden, and Arctic char. The bull trout and Dolly Varden were long considered the same species and are generally similar in appearance, but skeletal and genetic analyses have shown they are separate species (Behnke 2002). Large bull trout are known as voracious predators of other fish, although small bull trout typically feed on invertebrates. Bull trout spawn in

the fall, typically in the coldest reaches of smaller tributaries. Clean substrate (rocks), cold water temperatures, and the presence of cover are important attributes of preferred bull trout habitat.

Bull trout are especially vulnerable to human-induced factors that increase water temperature and sediment loads, change flow regimes, block migration routes, and establish non-native trout, particularly brook trout (Behnke, 2002).

Bull trout are present in the South Fork Clearwater River and many of its tributaries, including American River and Crooked River. Bull trout have been documented in American River, Upper American River East Fork American River and Kirks Fork. One bull trout was observed in the 1989 survey of Flint Creek and no bull trout have been documented using Box Sing Creek.

Crooked River is an important stream for bull trout. The weir at the mouth of this system is managed by Idaho Department of Fish and Game. They observe both adult and juvenile bull trout moving in and out of the system. The headwaters provide important spawning and rearing habitat for this fish and the mainstem is a well used travel corridor. Bull trout have been observed using Lower Crooked River, Middle Crooked River, and Silver Creek. The upper Crooked River watersheds (outside the project area) are recognized as very important for spawning and rearing of bull trout.

FALL-CHINOOK SALMON

Fall Chinook Salmon (*Oncorhynchus tshawytscha*) is listed as a threatened species in the Clearwater River basin (Federal Register, Vol. 57, No. 78, 14653, April 22, 1992). Fall Chinook salmon are not found in the American and Crooked River area, but they do occur downstream in the lower reaches of the South Fork Clearwater River and in the mainstem Clearwater River.

Snake River fall Chinook salmon were historically less well-distributed across the upper Snake River basin than spring and summer Chinook, although the Snake River basin, including the Clearwater River, was considered to support the highest production of fall Chinook salmon in the entire Columbia River basin. The historic importance of the Clearwater River in providing spawning and early rearing habitat is presently unclear, but it is assumed it sustained a significant component of the entire population.

Snake River fall Chinook begin entering the Columbia River in August and continue through October, with peak migration occurring in early September. Returning adults have generally spent three or four years in the ocean. Adults generally arrive in the Clearwater River in October with fish present from September through December. Spawning occurs from November through early December. Fry emerge from late winter to early spring, juveniles rear over the ensuing spring and summer months, then migrate to the ocean in the fall before they are a year old.

FOREST SERVICE SENSITIVE AND STATE LISTED FISH SPECIES

In a letter dated March 12, 1999, the USDA Forest Service Northern Region Sensitive Species list was updated to include interior redband trout, boreal toad, northern leopard frog, and other wildlife and plant species on the Nez Perce National Forest.

SPRING CHINOOK SALMON

Spring Chinook Salmon (*Oncorhynchus tshawytscha*) are considered a sensitive species in the Northern Region, USDA Forest Service and are a species of special concern in the State of Idaho. They are not listed as a threatened species under the Endangered Species Act in the South Fork Clearwater sub basin because indigenous populations were likely eliminated from the Clearwater River by construction of Lewiston Dam in the early 20th century (Schoen et al. 1999; Murphy and Metsker, 1962). Naturalized populations of spring Chinook salmon, however, have been re-established in the South Fork Clearwater sub basin, including American River and Crooked River,

as a result of reintroduction efforts (Schoen et al. 1999) by federal and state agencies and the Nez Perce Tribe.

Both the American River and Crooked River watershed have a high inherent capacity to support spring Chinook salmon (USDA 1998), based on features such as climate, relief, and geology. These river systems are comprised of significant lengths of low gradient, meadow reaches that provide optimal spawning and rearing habitat for this species, offering large areas of appropriately-sized spawning gravels as well as preferred low gradient rearing habitat for juveniles (USDA, 2003).

Historically, significant numbers of spring Chinook salmon spawned and reared in these systems as well as other tributaries of the South Fork Clearwater River. Currently, adult returns vary but are generally low. In 2003, the weir at the mouth of Crooked River counted 1360 returning adult spring Chinook. The 1990 fish habitat survey conducted by Clearwater BioStudies, Inc. (Fish Habitat Characteristics, Riparian Conditions and Salmonid Abundance In The Crooked River Study Area, November, 1990) identified 9810 square meters of spawning gravel available in the mainstem river from the mouth to Orogrande. If this habitat were fully seeded, even in the existing condition, there is potential to produce over 500,000 spring Chinook smolts annually in Crooked River. The American River is a very similar system. Both rivers have been dredge mined using large floating bucket line dredges which resulted a loss of pool habitat, removal of acting and potential woody debris and wider more shallow streams.

Spring Chinook salmon have been identified in Upper, Middle and Lower American River, East Fork American River, Kirks Fork, Flint Creek and Box Sing Creek. In Crooked River, they have been identified in Lower Crooked River and Middle Crooked and are likely to also use Relief Creek, Silver Creek and Quartz Creek.

INTERIOR REDBAND

Interior Redband Trout (*Oncorhynchus mykiss gairdneri*) includes both anadromous steelhead (discussed above) and native resident rainbow trout that do not migrate to the ocean (Behnke, 2002). They are classified as the same species, except fish included in this category spend their entire lives in a stream or river, often at or near their natal area. Only the anadromous form is listed as threatened under the Endangered Species Act.

In most anadromous steelhead populations, a portion of the juveniles do not migrate to the ocean and remain as resident redbands throughout their lives (Behnke, 2002). This is the likely scenario in the American and Crooked River watersheds. Most juveniles migrate to the ocean but small percentages probably remain as resident fish. There are no known isolated populations that are exclusive resident, although redband spawning was observed in East Fork Relief Creek (W. Paradis personal observation, 2003) such populations exist elsewhere on the Nez Perce National Forest and in the South Fork Clearwater sub basin.

WESTSLOPE CUTTHROAT

Westslope Cutthroat Trout (*Oncorhynchus clarki lewisi*) are considered sensitive in the Northern Region, U.S. Forest Service and a species of special concern by the State of Idaho. Currently, they are not listed or proposed for listing under the Endangered Species Act. In a letter dated June 10, 1998, the U.S. Fish and Wildlife Service “determined that a petition to list the westslope cutthroat trout...presented substantial information indicating that the requested action may be warranted”. Cutthroat trout are widely distributed across the Clearwater basin, although the current abundance is probably less than historic abundance.

Westslope cutthroat trout are widespread in the project area, and have been found in virtually every tributary where surveys have been conducted. Populations may also be present in

additional areas where surveys have not been conducted or where existing information is insufficient to define species presence or absence. Strong populations of resident fish have been observed in Quartz Creek and Silver Creek.

The isolated populations in Queen and Whitaker offer unique opportunities to study genetic differences between isolated fish and those subject to hybridization with non-native rainbow trout. There is also the opportunity to connect these streams to the mainstem and monitor fish dispersal and genetic changes.

Although population status of resident westslope cutthroat trout is thought to be strong in some streams, the larger fluvial fish, those moving out of the tributaries and rearing in the mainstem are showing very low densities, making this species at risk.

Primary existing threats to westslope cutthroat trout in the project area include habitat degradation, loss of connectivity among populations, competition with non-native brook trout, and harvest of adults by anglers.

PACIFIC LAMPREY

Pacific Lamprey (*Lampetra tridentata*) is considered a State of Idaho species of special concern. Recent sampling in the South Fork Clearwater River indicated the presence of juvenile lampreys along the mainstem river and some of the tributaries (IDFG, 2003). Similar sampling conducted in Crooked and American Rivers in 2001 did not identify any lampreys.

OTHER AQUATIC SPECIES

Brook trout (*Salvelinus fontinalis*) are present throughout the American River and Crooked River watersheds, including most streams in the project area. Brook trout are not native to streams west of the Continental Divide. Brook trout can occupy a wide range of habitats and have the ability to compete with trout, salmon, and char that are native to streams in Idaho. In degraded habitats, brook trout will often out-compete native bull trout (Clearwater Basin Bull Trout Technical Advisory Team 1998). Where the species co-exist, brook trout are likely to displace native westslope cutthroat, particularly in low gradient streams (Griffith, 1998).

Brook trout are a fall-spawning species, and interbreeding with bull trout is common in areas where the species coexist. Brook trout are usually much more abundant than bull trout where they occur together, and this distorted ratio of abundance can lead to mass hybridization (Behnke, 2002).

Surveys have documented brook trout in Mainstem American River, Whitaker Creek, Flint Creek, and Mainstem Crooked River. Bull trout and westslope cutthroat trout are also present in these areas.

The American and Crooked River project area is also known to support various other aquatic species and amphibians. Mountain whitefish (*Prosopium williamsoni*), sculpins (*Cottus* spp.), and dace (*Rhinichthys* spp.) have been observed throughout most of the area.

Tailed frogs have been documented in area streams and are believed to be widely distributed. Other amphibians documented within the watershed include Columbia spotted frogs and Idaho giant salamanders. Western toads and long-toed salamanders are also probably present. Amphibians are discussed in greater detail in the Wildlife chapter of this document.

ANALYSIS METHODS

INTRODUCTION

We will first describe in general, how we determine existing conditions for fish and fish habitat. This analysis will focus on six elements of fish habitat. This general discussion will be followed by a

detailed description for the two river systems (American River and Crooked River) and how these elements will change as a result of this project. We will end with a discussion of cumulative effects.

INDICATOR 1 - SEDIMENT

Substrate conditions are an important component of fish habitat and fish survival. Cobble embeddedness is a measure of fine-grained sand that has filled in around the cobble substrate. The more embedded the substrate is the more reduction we see in over wintering habitat and food production.

Cobble embeddedness and percent surface fines were used as measures of the amount of deposited sediment present in the streambed.

Existing measured or estimated cobble embeddedness and percent surface fines have been compared to optimal stream conditions and assigned a percent. These conditions, referred to colloquially as “desired future condition” standards, are presented below in Tables 3.22 and 3.23, along with the existing condition and percent of optimal.

Existing measured or estimated cobble embeddedness in analysis area streams was also used to estimate summer and winter rearing capacities for trout and salmon, using the FISHSED model (Stowell et al. 1983). The FISHSED model was then used to compare action alternatives using both existing cobble embeddedness measurements and predictions of NEZSED. These elements were used to roughly predict amount of change in summer and winter rearing capacity among action alternatives using mathematical relationships in the FISHSED model. These changes were calculated for each alternative and are an indication of the amount of sediment expected as a result of surface sediment erosion. Modeled predictions for all action alternatives were included. Sediment from sources other than surface sediment erosion, including bank erosion and mass movement (landslides) are not included in model estimates.

The FISHSED model includes calculations for fish embryo survival, summer rearing capacity, and winter rearing capacity. Fish embryo survival is an estimate of predicted fine sediment by depth in cobble stream bottoms. Summer and winter rearing capacity reflect how the degree of fine sediment in the stream bottom affects the stream’s ability to support fish during these seasons. For the American and Crooked River analysis, the model was not used to estimate changes in embryo survival because percent fine by depth data, which are substrate core data measurements, were not available. In general, the Nez Perce National Forest has not collected substrate core data since the late 1980s. One reason these data are no longer collected is research published in 1988 suggested modeling embryo survival in egg pockets does not accurately reflect conditions faced by embryos or emerging fry in real-life stream situations (Chapman, 1988).

Model results, as displayed below in Tables 3.22 and 3.23 are reasonable estimates and not absolute numbers with high statistical precision. The capability of the FISHSED model in analyzing and displaying change at the levels shown in these tables is somewhat limited. In this case, data from FISHSED are most useful in comparing the relative effects among alternatives. The model also reflects short-term changes only and does not show the long term recovery, projected in NEZSED

INDICATOR 2 - LARGE WOODY DEBRIS

Large woody debris is a component of habitat quality and complexity and is also an important contributor to stream productivity, cover, and food production for fish and other aquatic organisms. Large wood in the streams also contributes to channel stability in small, low order streams, and is thus an important element even in streams where fish are not present. Under natural conditions, large wood is contributed to streams from the surrounding riparian areas as trees fall over and may

be recruited either discretely (one or two here and there) or in large numbers over a short period of time. The latter often occurs in response to a significant disturbance event, such as wildfire or an extreme weather event where floods or debris torrents wash large amounts of material into the stream. The existence of debris jams in streams is generally evidence of a past event of this type.

The amount of large woody debris in a stream is usually measured in the field during stream surveys by counting the number of large woody pieces present in the stream. Future woody debris recruitment is estimated by counting the number of trees in the riparian area that could fall into the stream.

Some stream reaches in the project area have been determined to be debris-deficient; most of these reaches occur in the streams that have been placer mined like mainstem American River and Crooked River as well as tributaries like Relief Creek.

INDICATOR 3 - POOL HABITAT

Pool:riffle ratio is an indicator of habitat quality and complexity, both of which are important elements for salmonid fishes in streams. In addition, the quality of pools is an important consideration. Pool quality is generally indicated by pool volume and pool depth, with larger, deeper pools offering greater quality.

Stream survey data have provided estimates of the number and quality of pools for streams in the American and Crooked River area that have been surveyed. The summarized data present pool information as pool:riffle ratio, with a ratio of at least 50 percent or more pools as highly desirable.

The number of pools in a stream and the quality of those pools can be affected by: (1) long-term increases in sediment yield, a phenomenon that can result in pool-filling and eventual loss of the pool; (2) increased bedload accumulation that also results in pool-filling; and (3) lack of large woody debris and other pool-forming structures, which can significantly affect streams that are dependent on large wood as the primary pool-forming mechanism. Therefore, changes in sediment yield and the amount of large wood available to fall in the stream are indicators for predicting changes in the number and quality of pools over time, as well as number of trees felled or placed into streams. In addition, pools may be artificially created during channel restoration or other habitat improvement projects.

INDICATOR 4 - WATER YIELD

Equivalent Clearcut Area (ECA) is used as a tool to assess potential changes in water yield. ECA is discussed in more detail in the Watershed section. Increases in water yield may indirectly affect fish habitat through increased bank erosion, channel down cutting, increased accumulation of larger streambed materials, reduction in number of pools, and overall simplification of habitat.

INDICATOR 5 - WATER QUALITY

TOXICS

Water Quality analysis includes introduction of toxic materials. We currently are proposing no tools for predicting the amount of toxic materials entering streams because we are implementing mitigation such that the risk of toxic materials entering streams is very low, and we do not expect a measurable effect from the use of these materials.

WATER TEMPERATURE

Potential increases in stream temperature are addressed by assessing the degree of activities in riparian areas that may result in increased or decreased solar radiation to streams. See the Watershed section above for a detailed discussion of this element.

INDICATOR 6 - HABITAT CONNECTIVITY/FISH PASSAGE

The ability for fish to move between habitats as conditions change and for individuals to move between fish populations is an important component for short-term survival and long-term population genetic diversity. Culvert improvement work associated with this action will focus on both increased culvert size for better passing of flood flows and movement of aquatic biota up and down stream.

Habitat connectivity will simply be a measure of increased stream miles displayed and perennial or intermittent stream miles above culvert improvements. Not all sites involve fish passage.

Table 3.21: Existing Stream Crossings American River

Watershed Name	Ephemeral Crossings	Perennial Crossings	Fish Bearing Crossings	Total Crossings
Upper American River		1	1	1
Middle American River	2	7	9	9
Lower American River	6	8	10	14
Kirks Fork	2	2	1	4
Whitaker Creek	4	2	2	6
Queen Creek	2	1	1	3
Flint Creek	4	7	4	11
Box Sing Creek	1	1	1	2
TOTAL				50

Table 3.22: Existing Stream Crossings Crooked River

Watershed Name	Ephemeral Crossings	Perennial Crossings	Fish Bearing Crossings	Total Crossings
Lower Crooked River	15	8	6	23
Relief Creek	17	5	6	22
Middle Crooked River	9	24	11	33
TOTAL				78

Overall, the presence of roads is highly correlated with changes in species composition, population sizes, and hydrologic and geomorphic processes that shape aquatic and riparian systems. Research shows the importance of removal or restoration of existing roads to benefit both terrestrial and aquatic biota (Trombulak and Frissell, 1999). Roads can alter the landscape distributions of the starting and stopping points of debris flows, and they can alter the balance between the intensity of flood peaks and the stream network's resistance to change (Jones et al, 1999). Road crossings can prevent or interfere with upstream migration of adult and juvenile salmonids, aquatic macro invertebrates, and larval amphibians (Furniss et al., 1991).

Roads, culverts, and sometimes bridges act like dams, constricting stream flow through a single narrow outlet. This can prevent the transportation of habitat-forming gravel and woody material

down the channel. These constriction points also cause deposition and channel widening at the culvert inlet (USDA unpublished data, 1996 – 1999). The channels below culvert outlets are typically down cutting and scoured by the high velocity water caused by constriction.

Roads and stream crossings have also been shown to function as barriers to the upstream movement and dispersal for many fish and wildlife species (Furniss et al., 1991). Culvert outlets not in contact with stream bottoms do not allow access for aquatic species. Undersized culverts constrict flows creating high velocity barriers and eliminating substrate from culvert bottoms. These barriers can isolate small aquatic populations, limiting or preventing genetic exchange between populations, and preventing the recolonization of historic or recovering habitats.

Stream crossing structures also limit or prevent seasonal upstream movement by fish. Juvenile salmonids living in rivers often seek refuge in tributary streams during high flow events. Additionally, many culverts are in need of repair or replacement to reduce risk of failure. Historically, most culverts were sized to pass 50-year storm events. In many cases, this sizing is not adequate to handle large flood events or debris torrents. Culverts sized for a 100-year or greater event are more likely to pass the water and debris associated with a large event.

ANALYSIS OF DIRECT, INDIRECT, AND CUMULATIVE EFFECTS TO THREATENED, ENDANGERED, AND SENSITIVE (TES) FISH SPECIES.

TES fish species present in the American and Crooked River watersheds include spring Chinook salmon, steelhead trout, bull trout, and westslope cutthroat trout. Changes in habitat could affect these species directly, indirectly, and/or cumulatively and are collectively considered indicators of effect. A Biological Assessment will be completed for threatened, endangered, and sensitive fish species for the preferred alternative when it is identified, assuming the preferred alternative is not Alternative A. Indicators used in the Biological Assessment may vary and would be based on accepted indicators developed by the Central Idaho Level 1 Team. The results of the BA and any outcomes associated with consultation will be included in the Record of Decision.

EXISTING CONDITION OF HABITAT CHARACTERISTICS AND ENVIRONMENTAL EFFECTS

AMERICAN RIVER (UPPER, MIDDLE AND LOWER)- PRESCRIPTION WATERSHEDS - #17060305-05-09,06,16

American River is a large watershed with important aquatic values and a high priority for restoration of aquatic processes. The mainstem river is broken into three prescription watersheds (Map 7a). Upper American River is above the Elk City Township and primarily includes lands administered by the FS. Middle American River extends into the township and has experienced extensive amounts of placer mining and fish habitat degradation. Lower American River is within the township and has experienced similar impacts. The Bureau of Land Management administers lands within this area and much of the survey data and background information comes from their work (BLM, American River BA/BE, March 1999). Steelhead trout, bull trout, cutthroat trout, spring/summer Chinook salmon, rainbow trout, pacific lamprey, mountain whitefish, sculpin, and dace are present in the American River watershed. Their distribution is widespread, with the exception of bull trout for which the distribution is not well known. Brook trout are also present and widely distributed. Spring Chinook salmon and steelhead trout abundance is low. Westslope cutthroat trout populations vary; some areas are devoid of cutthroat trout while others have relatively high densities. The higher densities of cutthroat appear correlated with undeveloped areas in American River. There are very few large-sized migratory cutthroat trout.

Migratory bull trout are present in American River, although at low levels. The extent of resident bull trout in American River is not well known. Currently, it appears that the East Fork American River potentially provides the only spawning and early rearing areas for bull trout in the watershed. This project proposes only road decommissioning in East Fork American River. Surveys conducted by FS in 1998 did not document occurrences of bull trout in upper American River. Recent fish surveys conducted by BLM, FS, and IDFG (1996-2003) documented bull trout in mainstem American River, East Fork American River, and lower Kirks Fork.

The BLM surveyed Lower American River in 1992 using a modified Hankin and Reeves (1988) survey methodology. The dominant channel type was B, average gradient was 2 percent, and unstable stream banks averaged 2 percent. Lower American River occurs within the Elk City Township and a large amount of the stream bottom has been dredge mined. Yearlong and seasonal residences occur along some stream reaches. Dredge mining has reduced quality of pools and large woody debris is lacking. Dredge mining activity has reduced large woody debris recruitment along some reaches. High summer water temperatures and deposited sediment also reduce fish habitat quality.

The FS last did an extensive survey of American River (upstream from BLM boundary) in 1993 using the Nez Perce basin-wide methodology. During the survey approximately 69 percent of its length was classified as a B type stream channel. The remaining portion was classified as C and A channel types, 24 percent and 7 percent, respectively.

The FS and BLM have completed various stream improvement projects in the past, which include installation of rock check dams, log check dams, large woody debris, and habitat rock placement.

SUMMARY OF FISH SPECIES DISTRIBUTION

The American River area includes proposed critical habitat for listed steelhead trout and potential critical habitat for listed bull trout. Map 8a displays fish distribution within the analysis area.

Table 3.23: Known and suspected distribution of trout, salmon and char in American River

Stream Name	Westslope Cutthroat	Bull Trout	Spring Chinook	Steelhead	Brook Trout
Middle American River	Known Present	Known Present	Known Present	Known Present	Known Present
Upper American River	Known Present	Known Present	Known Present	Known Present	Known Present
East Fork American River	Known Present	Known Present	Known Present	Known Present	Known Present
Kirks Fork	Known Present	Known Present	Known Present	Probably Present	Status unknown
Whitaker Creek	Known Present	Probably Absent	Known Absent	Known Absent	Known Present
Queen Creek	Known Present	Probably Absent	Known Absent	Known Absent	Status unknown
Flint Creek	Known Present	Known Present	Known Present	Known Present	Known Present
Box Sing Creek	Known Present	Probably Absent	Known Present	Known Present	Probably Present
Lower American River	Known Present	Known Present	Known Present	Known Present	Known Present

EAST FORK AMERICAN RIVER – PRESCRIPTION WATERSHED -#17060305-05-10

East Fork American River flows into American River at river mile 10.6, and provides habitat for steelhead, bull trout, spring Chinook salmon, westslope cutthroat trout, brook trout, mountain whitefish, sculpin, and dace. Bull trout use the stream for adult and sub adult rearing. Fish population surveys of the stream in recent years by BLM, FS, and IDFG (1996 - 2003) have

documented the presence of bull trout, however, numbers were low and most fish were found in the middle reach. The stream may be used for bull trout spawning and early rearing, further investigations are needed for verification. The lower reaches to mid reaches of the stream flow through a timbered bottom with some stringer meadows. A culvert installed at the mouth may be a partial/full fish passage barrier. A private residence occurs near the mouth. A trail parallels the creek. The lower reaches crossing BLM lands are not leased for grazing, however, FS lands are permitted for grazing. The East Fork American River was surveyed by the BLM in 1992 from the mouth to FS boundary (stream mile 2.33). In 1993 the FS surveyed from that point to the headwaters. Both surveys used a modified Hankin and Reeves survey methodology (Hankin and Reeves 1988). The dominant channel type in lower reaches was B3 and average gradient ranged from 1 - 2 percent, and unstable stream banks were 2 percent. The seven-day running average maximum temperature during steelhead and cutthroat spawning periods for East Fork American River is 13.4 degrees C, and is rated high (SM 0.1 - 1995). No data on rearing temperatures are available for the middle reach, but spot monitoring during fish surveys in 1998 found cool water temperatures, which rated high for steelhead and bull trout rearing. The seven-day running average maximum temperature for bull trout spawning was 14.4 degrees C, and is rated low (SM 0.1 - 1995). The seven-day running average maximum temperature for rearing is 16.1 degrees C, and is rated moderate for steelhead and low for bull trout (SM 0.1 - 1995). Primary limiting factors include high levels of deposited sediment and lack of good quality pools. Recon surveys were conducted in 2003 in support of this project.

KIRKS FORK - PRESCRIPTION WATERSHED -#17060305-05-11

Kirks Fork flows into American River at river mile 6.9, and provides habitat for steelhead, bull trout, spring Chinook salmon, westslope cutthroat trout, brook trout, mountain whitefish, sculpin, and dace. Bull trout use the stream for adult and sub adult rearing. Fish population surveys of the stream in recent years by BLM, FS, and IDFG (1996 - 2003) have documented the presence of bull trout, however, numbers were low. A full fish passage barrier at all flows occurs at stream mile 2.3 (18 foot falls/cascades). The upper reaches of the stream consist of high quality westslope cutthroat trout habitat. The lower reaches receive moderate grazing use; and roads and logging have impacted the stream to varying levels. The limited amount of management activities in this watershed and the high quality fish habitat is not reflected above with the Forest Plan showing this stream well below its' fish/water quality objective of 90 percent of habitat potential. The plan shows existing conditions at only 50 percent and actual conditions are likely higher. A ford crosses the stream near the mouth. BLM monitoring of cobble embeddedness was 45 percent (stream mile 0.15 - 1995) and spawning gravels had 30 percent fines less than 6.3 mm (1995). Kirks Fork was surveyed by the BLM in 1992 from the mouth to FS boundary (stream mile 0.55). The FS surveyed from the BLM boundary upstream in 1991. Both surveys used a modified Hankin and Reeves (1988) survey methodology. Recon surveys were completed in 2003. The stream flows through a confined timbered stream bottom. The dominant channel type in lower reaches was B3 and average gradient ranged from 2-3 percent, and unstable stream banks varied from 3-5 percent. BLM data shows the seven-day running average maximum temperature during steelhead and cutthroat spawning periods for Kirks Fork is 13.9 degrees C, and is rated high (SM 0.05 - 1995). The seven-day running average maximum temperature for bull trout spawning was 14.8 degrees C, and is rated low (SM 0.05 - 1995). The seven-day running average maximum temperature for rearing was 16.7 degrees C, and was rated moderate for steelhead and low for bull trout (SM 0.05 - 1995). Primary limiting factors include high levels of deposited sediment and lack of good quality pools.

WHITAKER CREEK - PRESCRIPTION WATERSHED -#17060305-05-12

Whitaker Creek flows into American River at river mile 8.5, and provides habitat for cutthroat trout, brook trout, dace and sculpin (Final Report YA-515-IA7-15, University of Idaho, 1978). Dredge

mining has altered the mouth of the stream leaving no above ground channel for the stream. The stream flows enter American River sub-surface thus isolating the fish populations above. Roads, logging, and mining have impacted the stream to varying levels. Two private residences occur at the mouth of the creek. Extensive private land timber harvest has recently (2003) impacted the watershed. Whitaker Creek was surveyed by the BLM in 1991 from the mouth to FS boundary (stream mile 1.5) using a modified Hankin and Reeves (1988) survey methodology. The FS surveyed their lands upstream in 1989 using the same methodology. Recon surveys were conducted for this analysis in 2003. The stream flows through a confined timbered stream bottom. The channel types starting from the mouth are C3 (short mouth area reach), B4, and A3; and average gradient ranges from 1 to 12 percent, and unstable stream banks were less than 3 percent. Primary limiting factors include high levels of deposited sediment, lack of good quality pools, and low flows.

QUEEN CREEK - PRESCRIPTION WATERSHED -#17060305-05-13

Queen Creek flows into American River at river mile 9.4, and provides habitat for cutthroat trout. Dredge mining has altered the mouth area and the stream flows into a dredge pond and has no connecting channel with American River. The stream flows subsurface through dredge tailings into American River thus isolating the westslope cutthroat population. We electrofished this stream in 2003 and identified 22 westslope cutthroat and 6 dace in a 23 square meter reach. Mining, roads, and logging have impacted the stream to varying levels. Queen Creek was surveyed by the BLM in 1991 from the mouth to FS boundary (stream mile 0.67) using a modified Hankin and Reeves (1988) survey methodology. The FS surveyed from the BLM upstream in 1989. Recon surveys were completed for this project in 2003. The stream flows through a wide valley bottom at the mouth, while upstream reaches flow through a confined timbered stream bottom. The channel types starting from the mouth are C2 (mouth area), B3, and A3; and average gradient ranges from 2-7 percent, and unstable stream banks were less than 3 percent. Primary limiting factors include high levels of deposited sediment, lack of good quality pools, and low flows.

The lower miles of Queen Creek indicate that there has been a moderate level of disturbance from past dredge mining and placer mining activities. Tailings piles are scattered in small piles across the valley floor, and an old access road parallels the stream on the North side. Both Queen Creek and Whitaker Creek offer unique opportunities to study isolated populations of westslope cutthroat trout. These paired watersheds are similar in size and share a history of land disturbing activities.

FLINT CREEK - PRESCRIPTION WATERSHED -#17060305-05-14

Flint Creek is a third order tributary of the East Fork American River. Flint Creek enters East Fork American River from the North approximately 2 miles upstream of the confluence East Fork American River and American River. Flint Creek is a low (0.5 percent) to moderate (4-6 percent) gradient stream. Flint Creek is primarily characterized as being Rosgen stream types “B” and “C” with most channel slope gradients ranging from 0.5 percent to 7 percent. There are a few short sections of stream type “A” in the upper headwaters of the stream. The stream flows through a “U” shaped valley formation. The upslope environment consists of moderately steep (30-45 percent) mid elevation granitic uplands. Historic stream surveys from 1970 and 1982 indicated that there had been a high level of livestock grazing disturbance within the Flint Creek drainage. The grazing strategies implemented as a result of the steelhead trout being listed under ESA have improved stream bank stability in Flint Creek. The drainage has also had large fire events in the 1800’s and early 1900’s. The Flint Creek Trail (Forest Service Trail #832) parallels the stream beginning approximately 0.75 miles upstream of the confluence with East Fork American River. Flint Creek supports westslope cutthroat and steelhead trout, bull trout, and spring/summer Chinook salmon. The FS surveyed Flint Creek using the basin-wide methodology in 1989. Recon surveys and

basin-wide surveys were also conducted in 2003 in support of the American and Crooked River Project.

BOX SING CREEK - PRESCRIPTION WATERSHED -#17060305-05-15

Box Sing Creek flows into American River at river mile 8.5, and provides habitat for steelhead and cutthroat trout. Dredge mining has altered the mouth area of the stream and the lower segment flows across the dredge mined stream bottom of American River. Livestock grazing occurs in the lower reaches; and roads and logging have impacted the stream to varying levels. A ford crosses the stream near the mouth. Box Sing Creek was surveyed by the BLM in 1991 from the mouth to FS boundary (stream mile 0.67) using a modified Hankin and Reeves (1988) survey methodology. The FS surveyed the upstream reaches using the same methodology in 1989. Recon surveys were conducted in 2003 in support to this project. The stream flows through a confined timbered stream bottom. The dominant channel type in lower reaches was B4 and average gradient was 2 percent, unstable stream banks were less than 3 percent. Primary limiting factors include high levels of deposited sediment, lack of good quality pools, and low flows. Box Sing is approximately 5.7 miles long. The lower 2.0 miles of Box Sing Creek indicate a moderate level of disturbance from past dredge mining and placer mining activities. Tailings piles are scattered in small piles across the valley floor, and an old access road parallels the stream on the North side.

SUMMARY

All of the project area streams in American River accept Whitaker Creek and Queen Creek are below their Forest Plan fish/water quality objectives (Table 3.23 above). Below is a summary of conditions observed by both the BLM and FS for streams affected by this action. Whitaker Creek and Queen Creek do not support steelhead and therefore percent surface fines were not measured and this indicator is not applicable.

Table 3.24: American River Existing Condition of Fish Habitat Indicators Compared to Objectives

Prescription Watershed	Cobble Embeddedness % (Forest Plan BO standard)		Pool:Riffle Ratio (DFC Standard)		Acting Large Woody Debris/ pieces per 100m (DFC Standard)		Percent Surface Fines (Steelhead/Bull Trout Matrix Standard)	
	Objective	Existing	Objective	Existing	Objective	Existing	Objective	Existing
Upper American River 17060305-05-09	<30	51	45:55	13:87	45	18	≤20	18
Middle American River 17060305-05-06	<30	50	45:55	29:71	45	22	≤20	34
Lower American River 17060305-05-16	<30	31	45:55	20:80	45	2	≤20	8
Kirks Fork 17060305-05-11	<30	32	45:55	33:67	45	33	≤20	22
Whitaker Creek 17060305-05-12	<40	61	30:70	5:95	35	51	*NA	30
Queen Creek 17060305-05-13	<40	42	30:70	9:91	35	63	*NA	20
Flint Creek 17060305-05-14	<30	58	45:55	20:80	45	20	≤20	20
Box Sing Creek 17060305-05-15	<40	44	30:70	7:93	35	12	≤20	28

- *Steelhead do not currently use this system.

DEPOSITED SEDIMENT (COBBLE EMBEDDEDNESS AND PERCENT FINES)

Table 3.25. Existing Condition of Select FISHSED Variables, Which Are Relevant to the Deposited Sediment Indicator

Watershed Name	Existing Cobble Embeddedness (%)	Existing Summer Rearing Capacity (Percent of Optimal)	Existing Winter Rearing Capacity (Percent of Optimal)
Upper American River	51	83	26
Middle American River	50	83	27
Lower American River	31	83	27
Kirks Fork	32	93	43
Whitaker Creek	61	75	20
Queen Creek	42	88	34
Flint Creek	58	77	22
Box Sing Creek	44	87	32

EXISTING CONDITION OF HABITAT CHARACTERISTICS AND ENVIRONMENTAL EFFECTS

CROOKED RIVER

The watershed encompasses an area of approximately 45,659 acres with important aquatic values. Crooked River has been significantly affected by human activities primarily in the lower section (Lower Crooked River, Relief Creek and Middle Crooked River). The predominant feature is the historic dredge mining along and through the mainstem river, which has highly altered riparian processes and function. A streamside road for most of its length further affects the mainstem of Crooked River. This streamside road encroaches on riparian and stream process for about half of its length. The upper half of the watershed is mostly unroaded with reaches in the upper watershed supporting strong populations of westslope cutthroat trout and bull trout at some of the highest densities in the sub basin. Steelhead spawning and juvenile rearing primarily occurs in the mainstem and the lower 0.5 miles of each fork of Crooked River. The East and West Forks of Crooked River are in nearly pristine condition.

It is considered a stronghold for westslope cutthroat, a habitat stronghold for bull trout, and a historic stronghold for spring Chinook and steelhead (USDA 1998).

Although the aquatic habitat condition in the upper watershed is good, the overall condition of this watershed is considered low. Crooked River is considered well below its 90 percent Forest Plan fish/water quality objective condition (USDA 1998).

Habitat complexity has been greatly reduced from the historic mining activities. In addition, road 233 parallels a 3.4 mile section of stream, within a narrow canyon. This road has reduced the large woody debris recruitment in this stretch of stream. Because of reduced habitat complexity and elevated cobble embeddedness levels, summer rearing and over wintering conditions are believed to be the limiting factors for fish. Approximately 400 habitat improvement structures were placed in Crooked River during the 1980s. About 30 percent of these are still functioning as intended, and provide improved fish habitat in many areas. This project will include activities designed to improve existing habitat enhancement structures, add additional structures and further improve riparian and stream conditions impacted by past mining activities.

The aquatic habitat condition in the upper watershed is good, supporting strong populations of westslope cutthroat trout, and bull trout at some of the highest densities in the sub basin. Although the habitat condition of the mainstem is low, it continues to support steelhead and spring Chinook. Brook trout, present primarily in the upper West Fork and in the lower mainstem, pose a risk to downstream bull trout and westslope cutthroat trout (USDA 1998).

Idaho Department of Fish and Game Facilities: A weir and fish-trapping facility, part of the Lower Snake River Compensation Project, are located on Crooked River approximately 1/2 mile upstream from the mouth. A rearing facility with acclimation ponds and a settling pond for wastes is approximately 10 miles further upstream.

SUMMARY OF FISH SPECIES DISTRIBUTION

The Crooked River area includes proposed critical habitat for listed steelhead trout and potential critical habitat for listed bull trout. Steelhead trout are present in all of the watersheds. Bull trout have been observed in Lower and Middle Crooked River and Silver Creek. They also use the South Fork Clearwater River for migration and rearing during periods of the year. Map 8b displays fish distribution within the analysis area.

Table 3.26: Known and suspected distribution of trout, salmon and char in Crooked River

Stream Name	Westslope Cutthroat	Bull Trout	Spring Chinook	Steelhead	Brook Trout
Lower Crooked River	Known Present	Known Present	Known Present	Known Present	Known Present
Relief Creek	Known Present	Probably Absent	Probably Present	Known Present	Status unknown
Middle Crooked River	Known Present	Known Present	Known Present	Known Present	Known Present
Silver Creek	Known Present	Known Present	Probably Present	Known Present	Status unknown
Quartz Creek	Known Present	Probably Absent	Probably Present	Known Present	Status unknown

LOWER CROOKED RIVER PRESCRIPTION WATERSHED #17060305-03-01

Landforms associated with Lower Crooked River suggest that the stream should be a Rosgen stream type “C”. Observations indicate that Lower Crooked River should have a well-developed floodplain, be a slightly entrenched stream and be relatively sinuous with channel slopes of 2 percent or less. Historical mining disturbance has altered floodplain development, indicated by the presence of large mine tailings dispersed haphazardly across the valley floor.

The Lower Crooked River sub watershed is 9487 acres in size and includes the mainstem of Crooked River and sixteen 1st order tributaries, five 2nd order tributaries and two 3rd order tributaries. Included in these tributaries are unnamed streams referred to in this document as Section 11 and Section 14.

RELIEF CREEK – PRESCRIPTION WATERSHED #17060305-03-03

Relief Creek is a low gradient stream encompassing 7475 acres. Relief Creek enters Middle Crooked River 6.8 miles upstream of the confluence of Crooked River and South Fork Clearwater

River. Relief Creek from its confluence with Crooked River upstream approximately 1.4 miles is a low relief stream that has been highly disturbed by dredge mining activities. The mine tailings from dredge activities were dispersed entirely across the valley floor. Often times the tailings were mechanically piled to form long continuous pilings along one side of the valley floor or the other. These piles are approximately 10 feet high, and have literally cut off the upslope drainage characteristics of the lower reaches of Relief Creek. This disturbance activity has likely interrupted the natural water yield and timing of the drainage. During the mechanical piling process the tailings located adjacent to the stream were heavily compacted resulting in a loss of organic structure along the stream banks, as well as, a loss of stream channel sinuosity. Floodplain development has also been interrupted because of the high level of disturbance associated with the dredge mining activities. Presently the lower reach of Relief Creek is a Rosgen stream type “B”. This has resulted in higher than expected levels of cobble embeddedness, and depositional filling of the pool areas.

In 1989, approximately 200+ rock and log weirs were installed in Relief Creek from the mouth of Relief Creek upstream to the confluence of the East Fork Relief (1.4 miles). The objective of this fish habitat improvement program included creation of pool habitat, establishment of flows conducive to deposition of cobbles suitable for spawning and improved sediment transport capabilities. During the 2003 field season, a preliminary field review indicates that most of the rock structures have been altered by high flows. The log structures are still in place according to the original design and placement and are creating some additional scour pools. The existing high numbers of acting debris are associated with these improvement structures.

MIDDLE CROOKED RIVER – PRESCRIPTION WATERSHED - #17060305-03-04

This prescription watershed includes the mainstem of Crooked River from the top of the narrows to Orogrande (see map 7b). This is not a true watershed; true watersheds include all lands draining through a stream reach. This prescription watershed drains only the center lands of the Crooked River watershed. Several named tributaries enter Crooked River through this section including Sawmill, Silver, Quartz, Baker Gulch, Rainbow Gulch, Five Mile and Umatilla Creeks. A short summary of each of the tributaries affected by this action is included below. The existing condition DFC and RMO analysis is based on mainstem Crooked River fish habitat conditions surveyed in 1990 as well as recon surveys conducted in 2003. Stream survey information gathered in 2003 will describe conditions in Silver Creek and Quartz Creek. Forest Plan Appendix A has identified Middle Crooked River as meeting its objective with habitat conditions at 90 percent of optimum. This is likely an error in the plan as it is well recognized that the dredge mining of the mainstem, combined with past roading and timber harvest, have simplified the fish habitat well below the 90 percent level, as identified below (Table 3.27)

SAWMILL CREEK

Sawmill Creek enters Middle Crooked River 8.3 miles upstream of the confluence of Crooked River and the South Fork Clearwater River. Sawmill Creek is 1.89 miles long and can be characterized as a Rosgen “B” stream type. No fish were observed in this small stream.

SILVER CREEK

Silver Creek is a moderate (4-10 percent) to high (10-20 percent) gradient stream entering Crooked River 9.2 miles upstream of the confluence of Crooked River with South Fork Clearwater River. Silver Creek is characterized as a Rosgen stream type “B” with channel slope gradients ranging from 1.5 to 5 percent. There are a few short sections of stream type “C” in the lower 2.0 miles of the stream, and some relatively short sections of stream type “A” in the middle to upper portions of the watershed. Silver Creek supports steelhead and bull trout. The upper reaches support a strong westslope cutthroat trout population. The University of Idaho students have

studied the amphibian populations. They found strong densities of pacific giant salamander and tailed frogs.

QUARTZ CREEK

Quartz Creek is a low (2 percent) to moderately high (4-20 percent) gradient stream entering Crooked River 10.2 miles upstream of the confluence of Crooked River with South Fork Clearwater River. Quartz Creek can be primarily characterized as a Rosgen stream type “B” with channel slope gradients ranging from 2.0 percent to 12 percent. There are a few short sections of stream type “C” in the upper headwaters of the stream, and some relatively short sections of stream type “A” in the middle to upper portions of the watershed.

Quartz Creek appears to be an unstable stream type with both channel degradation and aggradation occurring within various reaches of the stream. In conjunction with the historic mining disturbance, which may very well be stabilized at the present time, there has been some past timber harvest activities within the drainage that appear to have contributed to channel degradation through accelerated bank erosion, increased sediment supply and decreased sediment transport capabilities.

Table 3.27: Crooked River Existing Condition of Fish Habitat Indicators Compared to Objectives

Prescription Watershed	Cobble Embeddedness % (Forest Plan BO standard)		Pool:Riffle Ratio (DFC Standard)		Acting Large Woody Debris/ pieces per 100m (DFC Standard)		Percent Surface Fines (Steelhead/Bull Trout Matrix Standard)	
	Objective	Existing	Objective	Existing	Objective	Existing	Objective	Existing
Lower Crooked River 17060305-03-01	<30	80	45:55	13:87	45	8	≤20	Not available
Relief Creek 17060305-03-03	<30	55	45:55	21:79	45	51	≤20	55
Middle Crooked River 17060305-03-04	<30	35	45:55	36:64	45	6	≤20	Not Available
*Silver Creek	<30	55	45:55	56:44	45	87	≤20	15
*Quartz Creek	<30	49	45:55	23:77	45	75	≤20	15

*These streams are not prescription watersheds, although they are true watersheds.

Table 3.28: Existing Condition of Select FISHSED Variables, Which Are Relevant to the Deposited Sediment Indicator

Watershed Name	Existing Cobble Embeddedness (%)	Existing Summer Rearing Capacity (Percent of Optimal)	Existing Winter Rearing Capacity (Percent of Optimal)
Lower Crooked River	80	56	12
Relief Creek	55	80	24
Middle Crooked River	35	92	40
Silver Creek	55	80	24
Quartz Creek	49	84	28

ENVIRONMENTAL EFFECTS

INTRODUCTION

We will first describe in general, how we determine the effects of this action on fish and fish habitat and the methods used to analyze the changes to this habitat as a result of the American and Crooked River project. This general discussion will be followed by a detailed description for the two river systems (American River and Crooked River). We will end with a discussion of cumulative effects.

INDICATOR 1 - SEDIMENT ANALYSIS

Predicted increases in surface sediment yield, using the NEZSED sediment model, were used to calculate potential increases in cobble embeddedness and corresponding decreases in summer and winter rearing capacity using mathematical relationships in the FISHSED model. These changes were calculated for each alternative and are a reflection of the amount of sediment expected as a result of surface sediment erosion. Sediment from other sources, including bank erosion, mass movement (landslides), instream improvements, and other non road related improvement activities are not reflected in the model.

The FISHSED model includes calculations for fish embryo survival, summer rearing capacity, and winter rearing capacity. Fish embryo survival is an estimate of predicted fine sediment by depth in cobble stream bottoms. Summer and winter rearing capacity reflect how the degree of fine sediment in the stream bottom affects the stream's ability to support fish during these times of year. For the Meadow Face analysis area, the model was not used to measure changes in fish embryo survival because percent fine sediment by depth data, which are measurements (substrate core data) initially collected in the field, were not available.

Model results, as displayed below, are reasonable estimates and not absolute numbers with high statistical precision. The capability of the FISHSED model in analyzing and displaying change at the levels shown in these tables is somewhat limited. In this case, data from FISHSED are most useful in comparing the relative effects among alternatives. The model also reflects short-term changes only and does not reflect long-term benefits in sediment reduction as predicted by NEZSED. The results must be used in combination with sound professional judgment.

For the purposes of this modeling exercise, the two sediment peaks in the next decade predicted by NEZSED were combined into one peak, as if all sediment would be delivered to the streams in the same year. Combining these two peaks reflects the additive nature of cumulative sediment effects that occur over a relatively short period of time. In a sense, this is a "worst case scenario", in that these sediment peaks would not occur all in one year, and a measure of recovery may occur between peaks. Sediment transport capabilities in streams, however, depend on channel factors such as bed roughness, gradient, stream flow, and sinuosity.

All modeling was conducted for age 0+ steelhead trout. The data shown for Alternative 1 is the existing condition.

WATERSHED AND STREAM RESTORATION

For a complete listing of the activities covered in this section, please refer to Chapter 2 and Appendix D. In general, these actions are associated with areas within streamside riparian areas. In-channel work is planned for up to 24 miles of stream. Listed (ESA) fish are present in the area. The in channel disturbance from this work would cause sediment to be reintroduced. This short-term impact must be weighed against the long-term benefit as illustrated above with road obliteration. The NEZSED model is not designed for use with this type of project.

Mitigation measures are designed to minimize the short-term sediment being introduced. Aquatic specialists on the Forest would review project designs for all activities planned under this section. Forest personnel would monitor the implementation and effectiveness of this work.

In-channel activities may also result in disturbance to individual fish, both within the immediate work area and downstream. Increased turbidity during work may locally affect individual fish but would not be at a magnitude where serious harm or mortality would occur. Timing restrictions for in-channel work would result in avoidance of spawning fish or redds.

INDICATOR 2 - LARGE WOODY DEBRIS ANALYSIS

No timber harvest is proposed in streamside RHCAs, therefore no change is expected in potential woody debris while acting woody debris would actually increase along with the miles of instream habitat improvement work.

INDICATOR 3 - POOL ANALYSIS

Sediment impacts to pool habitat will be discussed in the sediment analysis. Actual pools and pool quality will improve along with the amount of instream habitat improvements.

INDICATOR 4 - WATER YIELD ANALYSIS

The existing conditions and a detailed analysis of this indicator are found above in the Watershed section. Increased water yield is one indicator used to assess potential effects among the alternatives, and it is a rough predictor of potential adverse changes in channel condition and instream habitat. The concept of equivalent clearcut area (ECA) is often used as a surrogate for quantitative water yield analysis. The effect on water yield is estimated by calculating the loss of forest canopy in a watershed following disturbance.

The National Marine Fisheries Service, in their 1995 LRMP Biological Opinion, suggests that an ECA of 15 percent is cause for concern in priority watersheds. The Matrix of Pathways and Indicators of Watershed Condition (NOAA Fisheries, et al 1998) identifies <15 percent ECA as high habitat condition, 15-20 percent ECA as moderate habitat condition, and >20 percent as low habitat condition. These thresholds were promulgated to provide a conservative approach to water yield that would avoid the following undesirable effects on stream habitat condition: accumulation of streambed materials (aggradation), channel braiding, channel down cutting, and increased bank erosion. These phenomena may collectively or singularly contribute to increased width/depth ratio, decreased number of pools, decreased pool quality, and overall simplification of instream habitat (Chamberlin et al., 1991).

INDICATOR 5 - WATER QUALITY ANALYSIS

TOXICS

Water quality in the project area could be affected by introduction of toxic materials to streams. Introduction of toxic materials could result in a potentially direct adverse effect on aquatic resources.

STREAM TEMPERATURES

Temporary road crossings in streamside riparian areas could affect stream temperature in the project area, if these activities result in a significant reduction in shade to the stream. Reduction in stream shading is a potential indirect effect. Further increases in stream temperature would adversely affect the existing aquatic species assemblage, even though some studies suggest that increased solar radiation and higher stream temperatures could positively affect stream productivity

(Hicks et al., 1991). Beneficial effects from temperature increases, however, would probably only occur where existing temperatures are very low. Summer stream temperatures in the American and Crooked River area currently do not meet standards (see Watershed section).

INDICATOR 6 - HABITAT CONNECTIVITY/PASSAGE ANALYSIS

Appendix D contains information on culvert replacements included with this action. The amount of improvement varies by alternative. The analysis below will display increased stream miles either accessible to fish or improved for passage of 100 year flood flows.

3.3.1. AMERICAN RIVER ANALYSIS OF EFFECTS

3.3.1.1. INDICATOR 1 - SEDIMENT ANALYSIS

The analysis of effects on fish resources from increased sediment is based on the Watershed analysis of sediment in the Watershed section above. The model results displayed below in Tables 3.30-3.32 display existing conditions with high cobble embeddedness and poor winter rearing capacity. The results of FISHSED show slight increases in cobble embeddedness and corresponding decreases in summer and winter rearing capacity for all fish-bearing streams under all action alternatives. Modeled activities include temporary road construction, road reconstruction, timber harvest and road decommissioning. It does not include site treatments for watershed restoration, instream fish habitat improvements, and roadside salvage.

Table 3.29: Comparison of Predicted Cobble Embeddedness (CE) by Alternative

Stream/Composite	Predicted % CE by Alternative				
	A	B	C	D	E
Middle American River	50	51	51	51	51
Lower American River	31	32	33	33	33
Kirks Fork	32	33	33	33	33
Whitaker Creek	61	64	65	64	64
Queen Creek	42	46	47	47	46
Flint Creek	47	49	51	51	50
Box Sing Creek	44	49	50	49	48

Table 3.30: Comparison of Summer Rearing Capacity (SRC) by Alternative

Stream/Composite	Predicted % SRC by Alternative				
	A	B	C	D	E
Middle American River	83	82	82	82	82
Lower American River	94	93	93	93	93
Kirks Fork	93	93	93	93	93
Whitaker Creek	75	72	72	72	72
Queen Creek	88	86	85	85	86
Flint Creek	85	84	83	83	83
Box Sing Creek	87	84	84	84	85

Table 3.31: Comparison of Winter Rearing Capacity (WRC) by Alternative

Stream/Composite	Predicted % WRC by Alternative				
	A	B	C	D	E
Middle American River	27	26	26	26	26
Lower American River	45	43	43	43	43
Kirks Fork	44	43	43	43	43
Whitaker Creek	20	19	19	19	19
Queen Creek	34	31	31	29	30
Flint Creek	29	28	27	27	27
Box Sing Creek	32	28	28	28	29

Predicted increases in cobble embeddedness are not at a magnitude where measurable changes would be expected to occur, and differences between the action alternatives, as modeled, are all within the margin of error for the model. The FISHSED analysis and the numbers above do show a trend in the action alternatives with Alternative E showing the least effect and Alternative D the most. There is also slight difference between Alternative A (no action), and the action alternatives.

The basic model assumption behind FISHSED is that an inverse relationship exists between the amount of fine sediments in spawning and rearing habitats and fish survival and abundance. In general, when sediment yields are increased over natural rates in Idaho batholith watersheds, especially on a sustained basis, fish biomass decreases. Fine sediment is known to degrade salmonid spawning and rearing habitat (Chapman and McCleod, 1987; Bjornn and Reiser, 1991), as suggested by the FISHSED model. Specifically, high sediment levels can impair habitat for spawning and rearing by: (1) trapping fry in redds when they are attempting to emerge; (2) depleting intergravel oxygen levels in redds, smothering eggs contained within; (3) limiting aquatic invertebrate populations used as a food source; (4) filling and thereby reducing the number of large pools which serve as primary feeding and resting areas for juvenile salmonids; and (5) filling spaces between rocks that serve as over wintering refuge for juvenile salmonids (NMFS Biological Opinion, 1998). We expect that changes in substrate condition from (modeled) increased surface sediment yield are not of a magnitude that effects on fish would occur.

An important concept in assessing effects on fish habitat from increases in surface sediment erosion for this project is that both the FISHSED and NEZSED models represent peak sediment yields, which in this case are temporary, with a final result of reduced road density and improvement in the existing baseline condition. The consequence of long-term improvement in watershed condition is a short-term increase, or pulse, in surface sediment yield, which must occur in order for the long-term goal of improvement to occur. Roads cannot be obliterated, and vegetation treatments cannot occur, without a pulse of sediment. Short-term risks of increased sediment yields should be considered in the context of long-term improvement in watershed and stream habitat condition.

ALTERNATIVE A (NO ACTION ALTERNATIVE)

Under the no action alternative, the existing baseline sediment yield would probably remain the same. No real improvement in watershed condition would occur, and deposited sediment levels in streams would likely remain the same. The risk of severe, stand-replacing wildfire would remain high or increase over time in the absence of vegetation treatments. With severe wildfire, there are risks of large pulses of sediment delivered rapidly to streams, which could adversely affect habitat already impaired by past human activities.

Benefits of Alternative A include no further ground-disturbing activities, which would result in no additional pulses of sediment. However this alternative would not address either the existing increased levels of sediment or the need for active stream, watershed and soils restoration.

ALTERNATIVE B

Under Alternative B, a pulse of sediment is expected, but this pulse is the second lowest of the action alternatives and would result in the second lowest short-term risks to fish habitat. Improvements would occur under this alternative but somewhat reduced from those included in Alternative E. Improvements would result in similar rates of recovery as Alternatives C and D (see Appendix E), and fish habitat conditions would likely improve. This alternative was designed to presents the least short-term risk to aquatic species. By avoiding long sections of temporary road and avoiding timber harvest in units posing risk to the aquatic resources. This alternative would construct approximately 4 miles less temporary roads than Alternatives C and D. Reduced soil compaction, culvert improvements, and native vegetation restoration, would improve watershed condition. The reduced baseline sediment yield resulting from road decommissioning and other improvement activities would aid in recovery of the watersheds.

Since no timber harvest is proposed within high-risk landslide prone and streamside RHCAs, no short-term increase in risk of mass wasting and landslide type disturbances is expected to occur.

ALTERNATIVES C AND D

Under Alternatives C and D, the percent over base sediment would increase the most as a result of the short-term peak associated with the implementation of activities. Reduced soil compaction, fish passage improvements, and native vegetation restoration, would still improve watershed condition. The reduced baseline sediment yield resulting from road decommissioning and other improvement activities would aid in recovery of the watersheds, and it is expected that fish habitat conditions would improve over time. The amount of sediment yield reduction modeled is generally slight with corresponding improvements in substrate condition also expected to be slight. The most significant reduction in sediment yield is expected in Queen Creek.

No timber harvest is proposed within streamside and wetland RHCAs and high-risk landslide prone RHCAs.

ALTERNATIVE E

Under Alternative E, no harvest is proposed within unroaded landscapes. This restricted timber harvest is coupled with the largest stream restoration package and provides for the most improvement (upward trend) in fish habitat and water quality. This expected reduction in activity related sediment yield is the greatest in Flint Creek, East Fork American River, and Queen Creek. Particularly in the first two prescription watersheds, Flint Creek and East Fork American River, the reduction in activity generated sediment and expected improvement in substrate condition is significantly greater than any of the other alternatives.

No timber harvest is proposed in streamside or landslide prone RHCAs.

3.3.1.2. INDICATOR 2 - LARGE WOODY DEBRIS ANALYSIS

ALTERNATIVE A

No riparian planting or adding of large woody debris would occur with this alternative. Trees would fall into streams and riparian areas at a natural rate and this element would slowly recover over time

ALTERNATIVES B, C, D, E

No instream improvement work is planned in American River. PacFish default buffers would be applied to streamside and wetland RHCAs. Acting and potential woody debris would not be affected by any of the alternatives.

3.3.1.3. INDICATOR 3 - POOL ANALYSIS

ALTERNATIVE A

This alternative would not allow for watershed improvement projects to be implemented. Existing non-point sediment sources would slowly heal over time and pool habitat would slowly improve.

ALTERNATIVES B, C, D, E

No instream improvement work is planned in American River. Pool habitats would be impacted slightly, in the short term, by deposited sediment. See sediment (FISHSED) analysis above for details. Watershed improvement projects and road obliteration work would reduce sediment sources and improve pool habitat over time.

3.3.1.4. INDICATOR 4 - WATER YIELD ANALYSIS

The Watershed section above discusses changes in ECA for affected watersheds in the project area. Alternative A displays the existing condition for each watershed. None of the alternatives propose increases in water yield that is expected to result in channel degradation or long term impacts to fish habitat.

ALTERNATIVE A

Under this alternative, ECA and any changes in water yield from past activities would continue to recover, except for areas affected by past tractor logging, dozer piling, and soil compaction. These areas are affected by low soil infiltration rates and may not recover in the absence of soil and other watershed restoration efforts. In addition, existing roads would continue to contribute towards ECA, and recovery, if any, would occur extremely slowly in the absence of road decommissioning and soil restoration. Lack of vegetation treatments may contribute to continued accumulation of fuels, potentially resulting in stand-replacing wildfires, which, depending on size, severity, and location, could result in significant water yield changes. Significant water yield changes could result in adverse effects on habitat not fully recovered from past impacts.

The benefits of this alternative, with respect to ECA and water yield, include no short-term changes in ECA and thus, no potential short-term changes in water yield and habitat condition.

ALTERNATIVE B

ECA would increase as a result of implementation of this alternative, but of all the alternatives, Alternative B offers the second least risk in all prescription watersheds, allowing the streams to recover more quickly. The Biological Opinion for Land and Resource Management Plans set 15 percent ECA as a threshold, which triggers a watershed assessment. Queen Creek, which supports an isolated population of westslope cutthroat trout and no listed steelhead or bull trout, does exceed this threshold. However, that guidance was directed at watersheds supporting listed fish. Stream surveys indicate the channel is stable and resilient, capable of withstanding slight increases in water yield. Soil and watershed restoration activities would hasten recovery of water yield.

ALTERNATIVES C AND D

ECA effects analysis for these alternatives were combined because they are similar. ECA would increase for all prescription watersheds under these alternatives. The most increase is associated with Queen Creek in terms of magnitude and potential risks, however as stated above, Queen Creek is resilient and the expected increases in water yield are well within this streams capabilities. Soil mitigation and restoration actions would lessen potential impacts.

ALTERNATIVE E

ECA would increase as a result of implementation of this alternative, but of all the alternatives, Alternative E offers the least risk in all prescription watersheds, allowing the streams to recover more quickly. The 15 percent threshold is reached in Queen Creek, which supports an isolated population of westslope cutthroat trout but as mentioned above, Queen Creek is resilient and capable of withstanding a slight increase in water yield. Increased soil and watershed restoration activities would hasten recovery of water yield.

3.3.1.5. INDICATOR 5 - WATER QUALITY ANALYSIS (TOXICS AND TEMPERATURE)

TOXICS

ALTERNATIVE A

Under this alternative, no use of herbicides, fuels, or any fire suppression chemicals is proposed above current levels. The risk of these materials entering streams would remain unchanged from the existing condition.

ALTERNATIVES B, C, D, E

Toxic materials used under the action alternatives include herbicides and fossil fuel derivatives, including diesel fuel, hydraulic fuel, various petroleum-based lubricants, and gasoline.

The two factors determining the degree of risk from toxic materials are the toxicity of the chemical and the likelihood that non-target organisms would be exposed to toxic doses (Norris et al., 1991). Toxicity alone does not make a chemical hazardous; exposure to a toxic dose must also occur. Chemicals may enter water by one or more of the following routes: direct application, drift, and mobilization in ephemeral stream channels, overland flow, and leaching (Norris et al., 1991).

Since no aerial application of herbicides is proposed, and hand application of herbicides would be restricted in streamside RHCAs, all the above mechanisms for delivery to streams are unlikely to occur. Given constraints on application of herbicides, introduction of herbicides to water, particularly in concentrations necessary to elicit an effect on aquatic organisms, is highly unlikely. The toxicities of the various herbicides proposed for use under the action alternatives, with their respective levels of concern, are contained in the American and Crooked River project file.

In addition, fueling and storage of fuels is prohibited in RHCAs, unless fuels in the storage area are completely contained such that an accidental spill would not leach into soil or water. Transport of fuels is regulated through mitigation that minimizes the risk of accidents or accidental introduction of these materials to streams. Therefore, the risk of fuel delivery to streams is considered discountable (extremely unlikely to occur).

STREAM TEMPERATURES

ALTERNATIVE A

Stream temperatures in American River area would remain unchanged over the short-term. Some improvement may occur over time as vegetation recovers in areas where shade has been reduced from past activities or where dredge mining has resulted in over-widened, shallow streams.

American River is currently not in compliance with the Idaho State Water Quality Standards (see Watershed above). Cold-water biota, salmonid spawning, and bull trout criteria were exceeded in 2003 at each of the monitoring sites. Additionally, temperatures exceeded temperature standards established with Amendment 20 of the Nez Perce Forest Plan. This included both the 18°C migration and rearing maximum and 16°C spawning maximum (Nez Perce Forest unpublished data 2003).

ALTERNATIVE B, C, D, E

Since harvest of timber within streamside RHCAs is not proposed under any of these alternatives, the risk of effect on stream temperature is discountable, or extremely unlikely to occur.

These alternatives have about the same effect. Stream buffers following Forest Plan Amendment 20 would be implemented for all alternatives. This, in combination with restoration, should moderate current stream temperature levels, and possibly decrease stream temperature in the long-term.

3.3.1.6. INDICATOR 6 - HABITAT CONNECTIVITY/FISH PASSAGE ANALYSIS

The American and Crooked River project area offers limited opportunities for increasing connectivity of fish populations. Exceptions to this are Queen, Whitaker and Telephone Creeks in American River. Dredge mining has blocked access to these streams from the mainstem American River. BLM is currently proposing to connect these systems through their Eastside Project. Some culverts have been identified and are included with the restoration activities associated with this action. Projects include hardening of existing fords as well as replacing culverts to allow for high flows and passage of aquatic biota. Increasing connectivity allows individual fish to migrate in and out of tributaries to seek cool water. Increased connectivity also promotes genetic exchange between populations thus increasing diversity.

Table 3.32: American River miles of stream with improved access.

Alternative	Perennial	Intermittent
B	1.8	.1
C	1.8	.1
D	1.8	.1
E	3.0	1.5

ALTERNATIVE A

The no action alternative would rely on existing road maintenance funds to replace, remove or repair existing culverts. This program is currently limited. Little of this work would be accomplished. Accomplished work would occur over a period of many years due to funding limitations.

ALTERNATIVES B, C, D

Road decommissioning and culvert replacement planned with these alternatives would remove problem culverts.

These alternatives allow for proper sized culvert installation at 3 sites, increasing fish access to 1.8 miles of stream.

ALTERNATIVE E

Road decommissioning and culvert replacement planned with this alternative would remove 10 problem culverts. This is the most improved fish access of all alternatives. The alternative increases fish access to 3 miles of stream.

3.3.2. CROOKED RIVER ANALYSIS OF EFFECTS

3.3.2.1. INDICATOR 1 - SEDIMENT ANALYSIS

The analysis of effects on fish resources from increased sediment is based on the Watershed analysis of sediment in the Watershed section above. The model results displayed below in Tables 3.34 – 3.36 display existing conditions with high cobble embeddedness and poor winter rearing capacity. The results of FISHSED show slight increases in cobble embeddedness and corresponding decreases in summer and winter rearing capacity for all fish-bearing streams under all action alternatives. Modeled activities include temporary road construction, road reconstruction, timber harvest and road decommissioning. It does not include site treatments for watershed restoration and instream fish habitat improvements.

Table 3.33: Comparison of Predicted Cobble Embeddedness (CE) by Alternative

Stream/Composite	Predicted % CE by Alternative				
	A	B	C	D	E
Lower Crooked River	80	82	82	82	82
Relief Creek	55	57	57	58	57
Middle Crooked River	35	36	36	36	36

Table 3.34: Comparison of Summer Rearing Capacity (SRC) by Alternative

Stream/Composite	Predicted % SRC by Alternative				
	A	B	C	D	E
Lower Crooked River	56	54	54	54	54
Relief Creek	80	78	78	78	78
Middle Crooked River	92	92	92	92	92

Table 3.35: Comparison of Winter Rearing Capacity (WRC) by Alternative

Stream/Composite	Predicted % WRC by Alternative				
	A	B	C	D	E
Lower Crooked River	12	12	12	12	12
Relief Creek	24	23	22	22	23
Middle Crooked River	40	40	40	40	40

Predicted increases in cobble embeddedness are not at a magnitude where measurable changes could occur, and differences between the action alternatives, as modeled, are all within the margin of error for the model. The FISHSED analysis and the numbers above do show Alternatives B and E having less impact to winter rearing habitat. There is also slight difference between Alternative A (no action), and the action alternatives.

The basic model assumption behind FISHSED is that an inverse relationship exists between the amount of fine sediments in spawning and rearing habitats and fish survival and abundance. In general, when sediment yields are increased over natural rates in Idaho batholith watersheds, especially on a sustained basis, fish biomass decreases. Fine sediment is known to degrade salmonid spawning and rearing habitat (Chapman and McCleod, 1987; Bjornn and Reiser, 1991), as suggested by the FISHSED model. Specifically, high sediment levels can impair habitat for spawning and rearing by: (1) trapping fry in redds when they are attempting to emerge; (2) depleting intergravel oxygen levels in redds, smothering eggs contained within; (3) limiting aquatic invertebrate populations used as a food source; (4) filling and thereby reducing the number of large pools which serve as primary feeding and resting areas for juvenile salmonids; and (5) filling spaces between rocks that serve as overwintering refuge for juvenile salmonids (NMFS Biological Opinion, 1998). We expect that changes in substrate condition from modeled increased surface sediment yield are not of a magnitude that effects on fish would occur.

An important concept in assessing effects on fish habitat from increases in surface sediment erosion for this project is that both the FISHSED and NEZSED models represent peak sediment yields, which in this case are temporary, with a final result of reduced road density and improvement in the existing baseline condition. The cost of long-term improvement in watershed condition is a short-term increase, or pulse, in surface sediment yield, which must occur in order for the long-term goal of improvement to occur. Roads cannot be obliterated, and vegetation treatments cannot occur, without a pulse of sediment. Short-term risks of increased sediment yields must be considered in the context of long-term improvement in watershed and stream habitat condition.

ALTERNATIVE A

Under the no action alternative, the existing baseline sediment yield would probably remain the same. No real improvement in watershed condition would occur, and deposited sediment levels in streams would likely remain the same. The risk of severe, stand-replacing wildfire would remain high or increase over time in the absence of vegetation treatments. With severe wildfire, there are risks of large pulses of sediment delivered rapidly to streams, which could adversely affect habitat already impaired by past human activities.

Benefits of Alternative A include no further ground-disturbing activities, which would result in no additional pulses of sediment. However this alternative would not address either the existing increased levels of sediment or the need for active stream, watershed and soils restoration.

ALTERNATIVE B

Under Alternative B, a pulse of sediment is expected, but this pulse is the second lowest of the action alternatives and would result in the second lowest short-term risks to fish habitat. Improvements would occur under this alternative but somewhat reduced from those included in Alternative E. Improvements would result in similar rates of recovery as Alternatives C and D (see Appendix E) and fish habitat conditions would likely improve. This alternative was designed to present the least short-term risk to aquatic species. By avoiding long sections of temporary road and avoiding timber harvest in units posing risk to the aquatic resources. This alternative would

construct approximately 7 miles less temporary roads than Alternatives C and D. Reduced soil compaction, culvert improvements, and native vegetation restoration, would improve watershed condition. The reduced baseline sediment yield resulting from road decommissioning and other improvement activities would aid in recovery of the watersheds.

Since no timber harvest is proposed within high-risk landslide prone and streamside RHCAs, no short-term increase in risk of mass wasting and landslide type disturbances is expected to occur.

ALTERNATIVES C AND D

Under Alternatives C and D, the percent over base sediment would increase the most as a result of the short-term peak associated with the implementation of activities. Reduced soil compaction, fish passage improvements, and native vegetation restoration, would still improve watershed condition. The reduced baseline sediment yield resulting from road decommissioning and other improvement activities would aid in recovery of the watersheds, and it is expected that fish habitat conditions would improve over time. The amount of sediment yield reduction modeled is generally slight with corresponding improvements in substrate condition also expected to be slight.

No timber harvest is proposed within streamside and wetland RHCAs and high-risk landslide prone RHCAs.

ALTERNATIVE E

Under Alternative E, no harvest is proposed within unroaded landscapes. This restricted timber harvest is coupled with the largest stream restoration package and provides for the most improvement (upward trend) in fish habitat and water quality. The reduction in activity generated sediment and expected improvement in substrate condition is greater than any of the other alternatives.

No timber harvest is proposed in streamside or landslide prone RHCAs.

3.3.2.2. INDICATOR 2 - LARGE WOODY DEBRIS ANALYSIS

ALTERNATIVE A

Alternative A would see little changes in acting and potential woody debris.

ALTERNATIVES B, C, D

Acting large woody debris would be increased as a result of instream improvement associated with the action alternatives. Alternative B would improve acting large woody debris numbers on 15.2 miles of stream and Alternatives C and D would improve 15.8 miles. This work will be important in moving this important stream toward its' Forest Plan objective.

ALTERNATIVE E

Alternative E would improve the most stream miles (23.8). This work will be important in moving both Relief Creek and Crooked River toward their Forest Plan objective.

3.3.2.3. INDICATOR 3 - POOL ANALYSIS

ALTERNATIVE A

No instream improvement work would be implemented under this alternative. Pool to riffle ratios in Crooked River and Relief Creek would remain below their objective.

ALTERNATIVES B, C, D

Sediment generated with these action alternatives would slightly impact pool habitat. Instream improvement projects would greatly increase both the number and quality of pool habitat in Crooked River. Alternative B would improve pool habitat on 15.2 miles of stream and Alternatives C and D would improve 15.8 miles. This work will be important in moving this stream toward its' Forest Plan objective.

ALTERNATIVE E

Alternative E would improve the most stream miles (23.8). This work will be important in moving both Relief Creek and Crooked River toward their Forest Plan objective.

3.3.2.4. INDICATOR 4 - WATER YIELD ANALYSIS

The Watershed section and Table 3.15 above display changes in ECA for affected watersheds in the project area.

ALTERNATIVE A

Alternative A displays the existing condition for each watershed. No change will occur under this No Action Alternative

ALTERNATIVES B, C, D, E

The slight increase in ECA to these prescription watersheds does not pose a risk to fish habitat. Middle Crooked River does include Silver and Quartz Creeks, which may show a more direct response to tree removal and corresponding increases in water yield. These drainages will be discussed in detail in the BE included with the Final Environmental Assessment.

3.3.2.5. INDICATOR 5 - WATER QUALITY ANALYSIS (TOXICS AND TEMPERATURE)

TOXICS

ALTERNATIVE A

Under this alternative, no use of herbicides, fuels, or any fire suppression chemicals is proposed above current levels. The risk of these materials entering streams would remain unchanged from the existing condition.

ALTERNATIVES B, C, D, E

Toxic materials used under the action alternatives include herbicides and fossil fuel derivatives, including, diesel fuel, hydraulic fuel, various petroleum-based lubricants, and gasoline. The two factors determining the degree of risk from toxic materials are the toxicity of the chemical and the likelihood that non-target organisms would be exposed to toxic doses (Norris et al., 1991). Toxicity alone does not make a chemical hazardous; exposure to a toxic dose must also occur. Chemicals may enter water by one or more of the following routes: direct application, drift, and mobilization in ephemeral stream channels, overland flow, and leaching (Norris et al., 1991).

Since no aerial application of herbicides is proposed, and hand application of herbicides would be restricted in streamside RHCAs, all the above mechanisms for delivery to streams are unlikely to occur. Given constraints on application of herbicides, introduction of herbicides to water, particularly in concentrations necessary to elicit an effect on aquatic organisms, is highly unlikely.

The toxicities of the various herbicides proposed for use under the action alternatives, with their respective levels of concern, are contained in the American and Crooked River project file.

In addition, fueling and storage of fuels is prohibited in RHCAs, unless fuels in the storage area are completely contained such that an accidental spill would not leach into soil or water. Transport of fuels is regulated through mitigation that minimizes the risk of accidents or accidental introduction of these materials to streams. Therefore, the risk of fuel delivery to streams is considered discountable (extremely unlikely to occur).

STREAM TEMPERATURES

ALTERNATIVE A

Stream temperatures in the Crooked River area are cooler than those in American River and they would remain unchanged over the short-term. See the Watershed section above for a more detailed discussion. Some improvement may occur over time as vegetation recovers in areas where shade has been reduced from past dredge mining or other activities resulting in over-widened, shallow streams.

Crooked River is currently not in compliance with the Idaho State Water Quality Standards (see Watershed above and Appendix E). Cold-water biota, salmonid spawning, and bull trout criteria were exceeded in 2003 at the monitoring sites. Additionally, temperatures exceeded temperature standards established with Amendment 20 of the Nez Perce Forest Plan during 2003. This included both the 18°C migration and rearing maximum and 16°C spawning maximum (Nez Perce Forest unpublished data 1999-2000).

ALTERNATIVES B, C, D

Since harvest of timber within wetland and streamside RHCAs is not proposed under any of these alternatives, the risk of effect from timber harvest and road building on stream temperature is discountable, or extremely unlikely to occur.

Stream improvements included with these action alternatives include riparian planting to increase stream shade. It can be expected that overtime; this work could improve water temperatures. Alternatives C and D provide for 15.8 miles and Alternative B allows for 15.2 miles.

ALTERNATIVE E

Alternative E provides opportunities for the greatest amount of improvement (23.8 miles).

3.3.2.6. INDICATOR 6 - HABITAT CONNECTIVITY/FISH PASSAGE ANALYSIS

Culverts have been identified and are included with the restoration activities associated with this action (Appendix D). Projects include hardening of existing fords as well as replacing culverts to allow for high flows and passage of aquatic biota. Increasing connectivity allows individual fish to migrate in and out of tributaries to seek cool water. Increased connectivity also promotes genetic exchange between populations thus increasing diversity. Not all stream miles listed below are for fish passage improvement. Culvert upgrades for passing of 100-year flood flows are also included.

Table 3.36: Crooked River miles of stream with improved access.

Alternative	Perennial	Intermittent
B	16.9	8.4
C	16.9	8.4
D	17	9
E	28.2	14.2

ALTERNATIVE A

The no action alternative would rely on existing road maintenance funds to replace, remove or repair existing culverts. This program is currently limited. Little of this work would be accomplished. Work would occur over a period of many years due to funding limitations.

ALTERNATIVES B, C, D

Alternatives B, C, and D improve fish passage and passing of flood flows for approximately 17 miles of perennial stream.

ALTERNATIVE E

Alternative E offers the most improved stream access miles.

3.3.3. CONSISTENCY WITH THE FOREST PLAN AND ENVIRONMENTAL LAW

The Nez Perce Forest Plan direction and regulatory framework relevant to fisheries was presented near the beginning of the Fisheries section and in Appendix E. It included a description of Appendix A - Nez Perce Forest Plan standards and guidelines, general guidelines for activities in riparian areas, a summary of relevant direction from Amendment 20 (PACFISH), and direction associated with the Endangered Species Act for listed fish species potentially affected by actions in the American and Crooked River area.

ALTERNATIVE A

This alternative prescribes no action and no treatments. The upward trend called for in the Forest Plan would be restricted to slower natural recovery rates. Degraded stream channels would remain unstable making recovery of ESA listed fish and their habitat more difficult.

ALTERNATIVES B, C, D, E

Actions proposed under these alternatives are consistent with the entry frequency and sediment yield guidelines in Appendix A of the Forest Plan. No harvest is proposed in wetland or streamside RHCAs. No harvest is proposed in high risk landslide-prone RHCAs.

Crooked River and American River have been designated priority watersheds for listed steelhead trout by the National Marine Fisheries Service (NMFS), as per recommendation by the Nez Perce National Forest. Direction issued in the LRMP Biological Opinion (BO) by NMFS in 1998 provided additional direction for activities occurring in priority watersheds. No watershed analysis has been completed for these watersheds.

UPWARD TREND OF BELOW OBJECTIVE WATERSHEDS – ALL ACTION ALTERNATIVES

The Nez Perce Forest Plan provides direction that timber harvest in sediment-limited watersheds that do not meet their Fish/Water Quality Objectives, as listed in Appendix A, would occur only where concurrent watershed improvement efforts result in a positive upward trend in habitat condition. Most all the prescription watersheds in the analysis area were included in this category. Criteria to determine compliance with the upward trend direction in Appendix A are detailed in a Forest Plan guidance document (Gerhardt, et al, 1991).

Given this information, consistency with this provision of the Forest Plan is applicable to most streams in the analysis area. Direct watershed improvement actions, which range from road obliteration, culvert upgrades, in-channel restoration, and non point sediment stabilization, are included with all alternatives (Appendix D) but Alternative A. Large-scale vegetation treatments, which include timber harvest, are designed in part to reduce fuel accumulations and improve stand condition over the analysis area. Both these categories of actions would result in a short-term increase in sediment but a long-term improvement in watershed condition.

Long-term declines in surface sediment yield are displayed in Figures located in the Watershed sediment analysis sections and Appendix E for each prescription watershed. These charts display a slight long-term improvement in baseline sediment yield conditions expected as a result of the action alternatives. Of the action alternatives, Alternative E offers the most rapid improvement versus the least short-term risk, while Alternatives C and D offer improvement; they also presents the most short-term risk. Alternative B falls somewhere in between.

Instream improvements in Crooked River will greatly improve fish habitat in this dredge-mined section of stream. Improvement actions would occur along with timber harvest activities. All action alternatives are consistent with Forest Plan direction concerning upward trend in below-objective watersheds. Appendix E includes the details of the upward trend analysis.

IRREVERSIBLE OR IRRETRIEVABLE EFFECTS

There are no known irreversible or irretrievable effects associated with fisheries or aquatic resources for any of the alternatives.

CUMULATIVE EFFECTS

The cumulative effects area for fisheries resources has been previously identified as American River and tributaries including the mainstem below the project area. Crooked River and its tributaries from Orogrande to the mouth of the South Fork Clearwater River. The South Fork Clearwater River from the mouth of both American River and Crooked River downstream to the confluence of the South Fork and Middle Fork Clearwater Rivers. In addition to activities included in this EIS, there are numerous past, current, and future planned actions downstream and upstream in the South Fork Clearwater sub basin. Table 3.0 - Projects Considered Under Cumulative Effects, lists these activities and the possible effects of these actions are described below. Both American and Crooked Rivers and the South Fork Clearwater River are subject to cumulative sediment and temperature impacts.

AMERICAN RIVER

Past events and activities affecting American River and its tributaries have been discussed at length throughout this document. The existing condition of the watershed and streams in the project area reflect the past disturbance history including private land development, mining, timber harvest, road building and cattle grazing. Of the indicators discussed in this section, sediment and

temperature are most relevant in terms of potential cumulative effects for current and reasonably foreseeable future actions.

Cumulative sediment effects in the American River watershed have been quantified through the NEZSED model, which included sediment from timber harvest, road construction, road reconstruction, and road decommissioning. Road to trail conversions, trail reconstruction, and watershed improvements were not included in the model. Sediment yield was additively routed to various points in the watershed, and effects of this yield to fish habitat were considered in the FISHSED model. In addition to surface sediment yield, sediment from other sources, including mass movement, bank erosion, culvert removal, livestock grazing, and watershed improvements have been addressed narratively in the Watershed Effects section.

In summary, American River and tributaries are subject to cumulative sediment effects due to past impacts in the watershed and the existing degraded condition. Additional sediment, regardless of the source, could further impact deposited sediment and other associated habitat elements. These impacts could adversely affect listed and sensitive salmonids in the project area. Impacts are expected to decrease, and condition is expected to improve in the ensuing years, resulting in higher habitat condition than currently exists. Of the alternatives, Alternative D presents the greatest risk in terms of cumulative sediment risks, and Alternative E presents the least risk. Alternative A, while presenting no short-term risks, would also not result in long-term improvement in watershed condition or the deposited sediment indicator.

Stream temperature is also an indicator not meeting standards. PacFish default RHCA buffers would protect existing shade. None of the alternatives is expected to degrade this condition.

Preliminary ECA calculations that include the proposed BLM Eastside Township Project (see Watershed above) project high ECA numbers in Whitaker, Queen and Box Sing Creek.

CROOKED RIVER

Past events and activities affecting Crooked River and its tributaries have also been discussed at length throughout this document. The existing condition of the watershed and streams in the project area reflect the past disturbance history including mining, timber harvest, road building and to a lesser degree cattle grazing. Of the indicators discussed in this section, sediment, water temperature, pool habitat and acting large woody debris are most relevant in terms of potential cumulative effects for current and reasonably foreseeable future actions.

Cumulative sediment effects in the Crooked River watershed have been quantified through the NEZSED model, which included sediment from timber harvest, road construction, road reconstruction, and road decommissioning. Road to trail conversions, and reconstruction, and watershed and stream improvements were not included in the model. Sediment yield was additively routed to various points in the watershed, and effects of this yield to fish habitat were considered in the FISHSED model. In addition to surface sediment yield, sediment from other sources, including mass movement, bank erosion, culvert removal, and instream improvements has been addressed narratively in the Watershed Effects section.

In summary, Crooked River and tributaries are subject to cumulative sediment effects due to past impacts in the watershed and the existing condition of this indicator is below its objective. Additional sediment, regardless of the source, could further impact deposited sediment and other associated habitat elements. These impacts could adversely affect listed and sensitive salmonids in the project area. Impacts are expected to decrease, and condition is expected to improve in the ensuing years, resulting in higher habitat condition than currently exists. Of the alternatives, Alternative D presents the greatest risk in terms of cumulative sediment risks, and Alternative E

presents the least risk. Alternative A, while presenting no short-term risks, would also not result in significant long-term improvement in watershed condition or the deposited sediment indicator.

Stream temperature is also an indicator at high risk of cumulative impacts, given its existing condition. None of the alternatives would degrade this condition. All action alternatives would improve stream temperatures by allowing riparian plantings to increase streamside shade.

Pool habitat and acting large woody debris would improve under all action alternatives with Alternative E providing for the most while Alternatives B, C, and D provide less.

SOUTH FORK CLEARWATER RIVER

American River and Crooked River as well as the South Fork Clearwater River have been subject to a variety of natural and human-caused events in the past 200 years (USDA, 1998).

Findings for aquatic resources in American River, Crooked River and the South Fork Clearwater River include substantial physical changes since the initiation of significant human disturbances in the 19th century. Specific activities include but are not limited to substantial in-channel mining in the mainstem rivers and tributaries, timber harvest throughout the subbasin, road construction and encroachment on streams, domestic livestock grazing, home construction and private land development, agriculture and cultivation, fire suppression, and many others. It is generally accepted that water quality and habitat in the South Fork Clearwater River is in a degraded condition, both from sediment and temperature impacts (USDA, 1998; USDA 1999).

Proposed activities on state and federal lands in the South Fork Clearwater subbasin are numerous and varied. They are displayed above in Table 3.0 and included here by reference.

Current land uses occurring on private lands include livestock grazing, timber harvest, agriculture, residence construction, road construction, sewage treatment, and water withdrawals for domestic use and irrigation. It is estimated that increases in general land uses would occur in the next decade. Additional information on private land activities is found in the South Fork Clearwater River Biological Assessment, 1998.

Given all the above information, the South Fork Clearwater River is at high risk for cumulative impacts, especially from additional sediment and temperature impacts. In general, the level of activity on federal lands is currently substantially less than in recent decades, and many actions are focused on restoration of tributaries to the river. Proposed mining activities may contribute substantially to the conditions in the subbasin, but mitigation for these projects is expected to ameliorate some of these impacts. Proposed timber sales on National Forest lands are subject to similar mitigation and upward trend requirements as the American and Crooked River Project, and although spikes of sediment may occur, in general stream habitat is expected to improve at least locally.

Actions associated with the American and Crooked River area may contribute cumulatively to sediment in the South Fork Clearwater River downstream from the mouth of American and Crooked Rivers. As discussed in the Watershed Cumulative Effects section, these effects would be short-term only, and improvements in watershed condition over time would contribute to improved conditions in the river, assuming concurrent impacts do not occur off National Forest lands.

3.3.4. CONCLUSIONS

EXISTING CONDITION

Fish habitat in the analysis area is in poor condition. Past bucket line dredging of the mainstem American River, Box Sing Creek, Whitaker Creek, Queen Creek and Crooked River, Relief Creek,

Silver Creek, and Quartz Creek, have left these systems with a very reduced carrying capacity for fish. Water temperatures are elevated due to the vegetative canopy that was removed by roads and dredging. Surveyed streams in the analysis area are below their Forest Plan objectives (existing and proposed) included in Appendix A. Habitat elements of most concern include high levels of deposited sediment, low number of high quality pools, high stream temperatures, and an overall simplification of habitat leading to reduced carrying capacity.

Road/stream crossings in the project area have culverts that block or impede upstream fish migration.

Westslope cutthroat trout and steelhead and bull trout, while located in the project area streams, densities are very low and the streams are priority watersheds (South Fork Clearwater River Landscape Analysis, 1998). Current habitat conditions may be limiting growth, reproduction, and survival of these species in the tributaries as well as in the mainstem rivers.

Spring Chinook salmon are found in the mainstem and tributaries of American and Crooked Rivers as well as in the South Fork Clearwater River.

Non-native brook trout exist in many streams in the analysis area especially in American River.

ENVIRONMENTAL CONSEQUENCES

Under the action alternatives, a short-term increase in sediment production is expected from vegetation treatments, road construction/reconstruction, road decommissioning and in channel improvements.

This short-term increase in sediment yield is not at a threshold where changes in stream substrate (cobble embeddedness) are expected to occur.

If Alternative A (no action) is implemented, watersheds and streams would remain in a poor condition and recover slowly over time.

Under the action alternatives, vegetation treatments, including timber harvest, may result in lower risk of large, stand-replacing fires. Such fires could adversely affect watershed condition. Short-term increases in sediment yield under the action alternatives are partly due to watershed improvement activities, which are expected to result in long-term improvement in habitat condition.

Equivalent Clearcut Area (ECA), a predictor of changes in water yield, would increase slightly under all action alternatives. This increase is not likely to result in adverse changes in fish habitat.

Of the action alternatives, Alternative E offers the most rapid improvement in watershed condition, with the least short-term risks, while Alternatives B, C and D offer a slower rate of improvement with higher short-term risks. Alternative B offers less short-term risk but also less long-term improvement than Alternatives C and D.

Fish in the project area, including steelhead trout, bull trout, Chinook salmon and westslope cutthroat trout, may be adversely affected by potential short-term changes in habitat condition. These species are also expected to benefit from long-term improvement in habitat condition. There is no anticipated risk to fish population viability as a result of this project.